

PATENT SPECIFICATION

(11) 1 243 894

NO DRAWINGS

1 243 894

(21) Application No. 52513/69 (22) Filed 27 Oct. 1969
 (31) Convention Application No. 171 578 (32) Filed 28 Oct. 1968 in
 (33) France (FR)
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(54) IMPROVEMENTS IN METHOD OF MANUFACTURING ALUMINIUM BRONZE—STAINLESS STEEL BIMETALLIC PLATES

SPECIFICATION NO. 1, 243, 894

By a direction given under Section 17 (1) of the Patents Act 1949 this application proceeded in the name of CREUSOT-LOIRE, a French Corporate Body of 5 Rue De Montessuy, 75 Paris 07, France.

THE PATENT OFFICE

R 4905/4

10 and by the following statement:—
 The present invention relates to a method of manufacturing bimetallic plates of aluminum bronze and stainless steel, by facing with deposited metal by means of arc welding.

15 This invention is also concerned with bimetallic plates obtained by carrying out this method, notably those intended for use as tube plates of heat transfer devices and the like.

20 Facing austenitic and austenitic-ferritic stainless steels by depositing aluminum-bronze by arc-welding is attended by the serious drawback of producing cracks under the bead in the base steel.

25 This cracking can be avoided by resorting to the method of this invention which permits of producing sound, highly reliable bimetallic plates, suitable notably for constructing tube plates for heat transfer devices and the like (as currently used in case corrosion by sea water is to be feared).

30 The method of this invention consists in obtaining a bimetallic plate from a base plate of austenitic or austenitic-ferritic stainless steel, by facing this base plate by arc-welding with an intermediate layer of austenitic-ferritic stainless steel having a ferrite content ranging from 10% to 20% ferrite by weight, then depositing a layer of aluminum bronze on said intermediate layer, also by arc-welding.

35 According to a preferred but non-limiting

40 [Price 25p]

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C = 0.05%
 Si = 0.5%
 Mn = 0.5%
 Cr = 20%
 Ni = 8%
 Mo = 2.5%
 Cu = 1.5%

All known and conventional arc-welding processes, whether manual or automatic, may be used for depositing the above-defined intermediate layer and facing same with aluminum bronze.

An advantageous application of this manufacturing method is notably the construction of bimetallic tube plates of heat transfer devices and the like.

Plates constructed according to at least the preferred embodiments of this invention are characterized by the following advantageous features in comparison with those obtained through other known methods:

- a sound alloy is definitely warranted,
- a higher mechanical strength is obtained, as well as
- an improved corrosion-resisting structure.

In order to afford a clearer understanding of this invention, a typical form of embodiment thereof will now be described by way of example in the case of the construction of four tube plates for heat transfer devices

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(54) IMPROVEMENTS IN METHOD OF MANUFACTURING ALUMINIUM BRONZE—STAINLESS STEEL BIMETALLIC PLATES

(71) We, COMPAGNIE DES ATELIERS ET FORGES DE LA LOIRE (ST CHAMOND—FIRMINY—ST ETIENNE—JACOB-HOLTZER), a body corporate of the French Republic, of

5 12, rue de la Rocheoucauld, Paris, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in

10 and by the following statement:—

The present invention relates to a method of manufacturing bimetallic plates of aluminum bronze and stainless steel, by facing with deposited metal by means of arc welding.

15 This invention is also concerned with bimetallic plates obtained by carrying out this method, notably those intended for use as tube plates of heat transfer devices and the like.

20 Facing austenitic and austenitic-ferritic stainless steels by depositing aluminum-bronze by arc-welding is attended by the serious drawback of producing cracks under the bead in the base steel.

25 This cracking can be avoided by resorting to the method of this invention which permits of producing sound, highly reliable bimetallic plates, suitable notably for constructing tube plates for heat transfer devices and the like (as currently used in case corrosion by sea water is to be feared).

30 The method of this invention consists in obtaining a bimetallic plate from a base plate of austenitic or austenitic-ferritic stainless

35 steel, by facing this base plate by arc-welding with an intermediate layer of austenitic-ferritic stainless steel having a ferrite content ranging from 10% to 20% ferrite by weight, then depositing a layer of aluminum bronze on said intermediate layer, also by arc-welding.

40 According to a preferred but non-limiting
 [Price 25p]

feature the intermediate layer is of stainless austenitic ferritic steel which includes by weight Cr, Ni and Mo selected from the following ranges 17% to 22% Cr, 8% to 12% Ni, and 2% to 4% Mo.

45 According to another preferred feature the intermediate layer consists of a steel grade already manufactured by the Applicant and assaying as follows:

C	=	0.05%
Si	=	0.5%
Mn	=	0.5%
Cr	=	20%
Ni	=	8%
Mo	=	2.5%
Cu	=	1.5%

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50 All known and conventional arc-welding processes, whether manual or automatic, may be used for depositing the above-defined intermediate layer and facing same with aluminum bronze.

55 An advantageous application of this manufacturing method is notably the construction of bimetallic tube plates of heat transfer devices and the like.

60 Plates constructed according to at least the preferred embodiments of this invention are characterized by the following advantageous features in comparison with those obtained through other known methods:

65 —a sound alloy is definitely warranted,
 —a higher mechanical strength is obtained, as well as

70 —an improved corrosion-resisting structure.

75 In order to afford a clearer understanding of this invention, a typical form of embodiment thereof will now be described by way of example in the case of the construction of four tube plates for heat transfer devices

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having a diameter of 994 millimeters and utilizing sea water as a heat carrier medium.

For each plate the base metal is an austenitic stainless steel assaying as follows:

5 Cr=18%, Ni=12% and C<0.030%, having a thickness of 53 mm. An intermediate layer of austenitic ferritic stainless steel assaying as follows: Cr=20%, Ni=8%, Mo=2.5%, Cu=1.5% and C<0.050% is deposited on the base layer or plate by arc-welding.

Then, a 15 mm thick layer of aluminum bronze is deposited thereon by arc-welding.

These plates are subsequently perforated 15 by drilling therethrough 1,021 holes having a diameter of 3/4", without observing any crack formation, and bimetallic tubes of the same grade as the base plates are fitted through these holes. The resulting assembly 20 is both homogeneous and economical.

WHAT WE CLAIM IS:—

1. Method of manufacturing bimetallic plates of stainless steel and aluminium bronze which comprises facing a base plate 25 of austenitic or austenitic-ferritic stainless steel by means of arc welding with an intermediate layer of austenitic-ferritic stainless steel having a ferrite content ranging from 10% to 20% ferrite by weight, said intermediate layer being subsequently faced with 30 a layer of aluminum bronze by arc-welding.

2. Method according to claim 1, in which

the intermediate layer of austenitic-ferritic stainless steel includes by weight Cr, Ni and Mo selected from the following ranges: 17% to 35 22% Cr, 8% to 12% Ni and 2% to 4% Mo.

3. Method according to claim 1, in which the intermediate layer of austenitic-ferritic stainless steel includes the following: 40

C	=	0.05%
Si	=	0.5%
Mn	=	0.5%
Cr	=	20%
Ni	=	8%
Mo	=	2.5%
Cu	=	1.5%

4. A method of manufacturing bimetallic plates substantially as described herein.

5. Bimetallic plates obtained by carrying out the method described in any one of claims 1, 2, 3 and 4, such plates being bimetallic plates of heat transfer devices and the like. 50

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